

Submitted for recognition as an American National Standard

**Cable Assemblies and Attachable Plugs,
External Electrical Power, Aircraft,
General Specification For**

NOTICE

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SAE AS7974

1. SCOPE:

1.1 Scope:

This specification applies to complete cable assemblies (using either molded on or attachable plugs) used to connect external electric power to aircraft and to attachable plugs used as replacement for plugs damaged in service.

1.2 Classification:

Each cable assembly or attachable plug (hereinafter referred to as item) shall be identified by the military part number listed on the applicable MS drawing or specification sheet. The products under this specification shall be one of the following types:

- a. Attachable connector plugs. Molded rubber connector plugs with mechanically attachable crimp contacts or splices.
- b. Cable assemblies. Assemblies consisting of connector plugs and other termination devices attached to single jacketed or banded cables.

1.3 Air Force applications:

- 1.3.1 Integrally molded plugs: Cable assemblies which are procured for Air Force original equipment applications shall only be integrally molded cable assemblies.
- 1.3.2 Attachable plugs: Air Force use of attachable plugs shall be limited to replacement of plugs damaged in service.

SAE AS7974

2. APPLICABLE DOCUMENTS:

2.1 Government documents:

- 2.1.1 Specifications and standards: The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

Federal

L-P-378 Plastic Film (Polyethylene Thin Gage)

PPP-B-636 Box, Fiberboard

PPP-C-843 Cushioning, Material, Cellulosic

Military

MIL-P-116 Preservation, Methods of

MIL-R-3065 Rubber and Synthetic Rubber Compounds, General Purpose (Except Tires, Inner Tubes, Sponge Rubber and Hard Rubber)

MIL-T-5624 Turbine Fuel, Aviation, Grades JP-4 and JP-5

MIL-C-5756 Cable and Wire, Power, Electric, Portable

MIL-R-6855 Rubber, Synthetic, Sheets, Strips, Molded or Extruded Shapes, General Specification for

MIL-I-23053 Insulation Sleeving, Electrical, Heat Shrinkable, General Specification for

MIL-L-23699 Lubricating Oil, Aircraft Turbine Engines, Synthetic Base

MIL-C-7974/1 Connector, Plug, Aircraft External Power

MIL-C-7974/2 Cable Assembly, External Power, Aircraft 115/200 Volt, 400 Hertz Power Distribution Flight Line (for A/E 24A-166A)

MIL-C-81790 Connectors, Receptacle, External Electric Power, Aircraft

MIL-R-81828 Rubber, Chlorosulfonated Polyethylene Elastomer, Sheet and Molded Shapes, Ozone Resistant

SAE AS7974

2.1.1 (Continued):

STANDARDS

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-STD-45662	Calibration Systems Requirements
MS20659	Terminal, Lug, Crimp Style, Copper, Uninsulated, Ring Tongue, Type I, Class 1
MS21378	Plugs and Cable Assemblies, External Power, Aircraft 230/400 Volt, 400 Hertz
MS24121	Wiring Harness, Single Point Refueling
MS24122	Wiring Harness, External Power, 115 Volt AC, Single Phase
MS24208	Cable and Plug Assembly, External Power, 115/200 Volts, 3 Phase, Single Point Refueling
MS25019	Cable Assembly-Jet Starting Power
MS25486	Connector, Plug, Attachable, external Electric Power, Aircraft, 115/200 Volt, 400 Hertz
MS25487	Connector, Plug, Attachable External Electric Power, Aircraft 28 Volt DC, Jet Starting
MS25488	Connector Plug, Attachable, External Power, Aircraft, 28 Volt DC Operating Power
MS90328	Cable Assembly, External Electric Power, Aircraft, 115/200 Volt, 400 Hertz

SAE AS7974

2.1.1 (Continued):

MS90347 Cable Assembly, External Electric Power, Aircraft, 28 Volt DC Operating Power

MS90362 Connector, Receptacle, External Power, Aircraft, 115/200 Volt, 400 Hertz

(Copies of specifications, standards, handbooks, drawings, publications and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Non-Government publications:

The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D1149 Rubber Deterioration-Surface Ozone Cracking in a Chamber

ASTM D1630-83 Standard Test Method for Rubber Property-Abrasion Resistance (NBS Abrader)

Application for copies of ASTM standards should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

2.3 Order of precedence:

In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specification sheets, or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS:

3.1 Specification sheets:

The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets or MS standards. In the event of any conflict between requirements of this specification and the specification sheets or MS standards, the latter shall govern.

SAE AS7974

3.2 Qualification:

Items furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list at the time of award of contract (see 4.5.1 and 6.4). Qualification of a cable assembly sample length will qualify for listing all lengths of like cable assemblies.

3.3 Design and construction:

Cable assemblies and plugs shall be of the design and construction and of the physical dimensions specified on the applicable MS drawing or specification sheet.

3.4 Cable assemblies:

- 3.4.1 Wire and cable: The wire and cable used in the cable assemblies shall be an ozone-resistant product which is qualified under MIL-C-5756. The cable insulation shall be continuous between plug body and termination lugs with a maximum separation between insulation and lug barrel of 1/4 inch. Additionally, a minimum length of two inches of properly sized shrinkable insulation sleeving in accordance with MIL-I-23053 shall be installed to symmetrically cover the insulation gap.
 - 3.4.1.1 Stripping insulation: When wires are stripped, for cables composed of less than or equal to 100 strands, not more than one strand shall be nicked or cut through. For all cables composed of more than 100 strands, no more than 1 percent of the strands shall be nicked or cut through when stripping the conductor insulation.
 - 3.4.2 Banding: Bundled cable shall be banded at intervals not to exceed 24 inches. The bands shall be of a nonmetallic material having an abrasion resistance index of at least 75 percent of the Standard reference compound when tested in accordance with ASTM D1630-83.
 - 3.4.2.1 Band tensile strength: There shall be no tearing of the bands or shifting of the bands on the conductors by more than one inch when tested in accordance with 4.7.14.
 - 3.4.3 Terminals: Lug terminals shall conform to MS20659, as specified on the applicable MS drawing or specification sheet and shall be crimped with the proper dies listed on MS20659 or equivalent as approved by the qualifying activity (see 6.4). Terminals and wire shall be free of foreign material. Soldered joints shall not be permitted.

SAE AS7974

3.4.4 Flexibility: There shall be no damage to the cable assemblies when they are flexed as specified in 4.7.6.

3.4.5 Cable assemblies with control leads: Cable assemblies that utilize control leads shall have contact E crimped to the white colored lead wire and contact F crimped to the black colored lead wire.

3.5 Plugs:

Unless otherwise specified (see 3.1), requirements for plugs shall apply both to plugs supplied on the cable assemblies and to separate attachable plugs.

3.5.1 Cable assembly plugs: As required by the cable assembly part number, the cable assembly plug may be either molded to, or mechanically attached to, the cable bundle.

3.5.2 Attachable plugs: An attachable plug shall be attachable to any cable conforming to the requirements detailed on the applicable standard for that plug. The plug shall be attachable by the use of military standard tools. Socket contacts shall be provided with crimp type barrel ends with diameters as specified on the applicable MS standard (see 3.1). When attached, the cable and new plug shall meet all applicable requirements of this specification.

3.5.3 Tension on plugs: When tested as specified in 4.7.10, cable assemblies shall be capable of withstanding, without damage, tension applied between the plug and each conductor.

3.5.4 Fabrication of plugs: The plugs shall be fabricated from chlorosulfonated polyethylene rubber conforming to MIL-R-81828, or synthetic rubber conforming to MIL-R-6855, Class 2, Grade 60, or rubber conforming to MIL-R-3065, Type S, Class 5B-720. The use of other materials will be considered by the qualifying activity. Such materials must be approved by the qualifying activity and must meet the test requirements of this specification.

3.5.4.1 Socket contacts: The small socket contacts shall be tellurium copper, leaded copper, or brass, with a minimum of .0002 inch of silver plate. The large socket contacts shall be tellurium copper or leaded copper or equal with a minimum of .0002 inch of silver plate. The conductivity of the alloys used for the large socket contacts shall be a minimum of 90 percent of the International Annealed Copper Standard (IACS).

3.6 Performance:

Each item shall perform satisfactory when subjected to the following conditions applicable to that item.

3.6.1 Abrasion resistance: The plug body material shall have an abrasion resistance index of at least 75 percent of the Standard reference compound when tested in accordance with ASTM D1630-83.

SAE AS7974

TABLE I. Depth of required abrasion resistance.

Part of plug	Min. Thickness (inches)
Front end	0.100
Widest sides-within one inch of front end	0.125
Remainder of sides	0.100

- 3.6.2 Engagement with receptacle: Each plug shall be engagable with the mating receptacle specified on the applicable MS drawing or specification sheet so that the front end of the plug touches the base plate of the receptacle.
- 3.6.3 Engaging and disengaging forces: When engaged within 1/16 inch of mating receptacle, the engaging or disengaging force values shall be the average of three consecutive applicable readings, using receptacle standards specified in 4.7.3.1.
- 3.6.3.1 Engaging: The force required to mate the plug with its applicable receptacle shall not, at any point of engagement, exceed 50 pounds for three-socket plugs and 100 pounds for six-socket plugs.
- 3.6.3.2 Disengaging: The force required to remove the plug from the receptacle at each point in the first half-inch of travel from the fully engaged position shall be 40 ± 10 pounds for three-socket plugs, and shall be 80 ± 20 pounds for six-socket plugs. The force required to remove the plug from the receptacle at all other points shall not exceed 50 pounds for three-socket plugs and shall not exceed 100 pounds for six-socket plugs.
- 3.6.3.3 Engaging, attachable connectors only: The force required to engage a gage pin contact shall be 24 pounds maximum for the A, B, C and N contacts and 2 pounds maximum for the E and F contacts.
- 3.6.3.4 Disengaging, attachable connectors only: The force required to remove a gage pin contact shall be 16 to 24 pounds for the A, B, C and N contacts and 2 pounds maximum for the E and F contacts.
- 3.6.4 Plug static strength: When tested as specified in 4.7.12, plugs shall be capable of withstanding without damage a force of 1000 pounds applied to the wider sides of the plugs.
- 3.6.5 Impact: When tested as specified in 4.7.4, plugs shall be capable of withstanding impacts of 20 ± 0.5 foot-pounds. The bands of each cable assembly shall be capable of withstanding impacts of 20 ± 0.5 foot-pounds.
- 3.6.6 Cable attachment to crimp barrel and lug terminal: When tested as specified in 4.7.11, plug crimp barrels and cable lug terminals shall meet the strength requirements of Table V.

SAE AS7974

- 3.6.7 Recessing of sockets: No part of any socket, nor any part which is electrically connected to any socket, shall be within 0.100 inch of the front end of the plug.
- 3.6.8 Prevention of misengagement: Each plug shall include means which shall prevent entry of a large pin into a small socket if an attempt is made to engage the plug and receptacle with the plug rotated 180° from the proper orientation. The small plug sockets shall be prevented from making electrical contact with any of the receptacle pins.
- 3.6.9 Structural integrity: Each plug shall be so constructed that if the widest sides of the plug within 1 inch of the original front end are ground away to a depth of 0.125 inch, no part of the plug will fail or become loose and the plug will meet all the requirements of this specification except 3.6.1 and 3.6.7.
- 3.6.10 Depth of sockets: Each large socket shall be in contact with its mating pin when the end of the pin has been inserted into the plug 0.500 inch from the surface of the front end of the plug.
- 3.6.11 Ozone resistance: When tested as specified in 4.7.18, the cable assembly or attachable plug shall exhibit no cracks when examined under a seven power optical magnifier after ozone exposure.
- 3.7 Dielectric strength:
- The cable assembly and attachable plugs shall be capable of withstanding for one minute the application of 2000 volts DC when tested as specified in 4.7.7. There shall be no current leakage in excess of 1.0 milliampere.
- 3.8 Voltage drop:
- With the plug of a cable assembly mated with a receptacle, the voltage drop from the end of each contact on the rear of the receptacle to a point on each corresponding wire of the cable assembly shall not exceed the values specified in Table III when tested as specified in 4.7.8.
- 3.9 Marking:
- 3.9.1 Socket identification: Socket identification shall be clearly and durably marked adjacent to each socket on the side or end as shown on the applicable MS drawing or specification sheet.
- 3.9.2 Cable lug terminal identification: The lug terminal identification shown on the MS drawing or specification sheet shall be clearly and durably marked on both sides of sleeving which shall be shrunk or cemented onto the insulation of the wire within six inches of the lug terminal. Each wire shall be electrically connected to the corresponding marked plug socket. Control leads, when specified, shall be from 2 to 6 inches longer than the power leads.

SAE AS7974

3.9.3 Item identification: Each item shall be marked as follows for identification in accordance with MIL-STD-130:

MS Part No.

Manufacturer's Part No.

Manufacturer's Name or Trademark

Date Indicator Which Defines Manufacturing Dates for Periods 3 Months or Less

3.9.3.1 Cable assemblies: Marking of cable assemblies shall be on a band or sleeving around all wires and located between any two clamping bands except the three nearest to the plug and the three nearest to the terminals.

3.9.3.2 Attachable plugs: Marking of attachable plugs shall be 3/16 inch minimum block style depressed characters located on the wide face of the plug body. Marking shall be readable when the cable entry end of the plug is facing downward.

3.10 Workmanship:

Items shall be fabricated and finished in a workman-like manner. There shall be no imperfections affecting the functioning and assembly of the product. Particular attention shall be given to freedom from chips, dirt, grit and other foreign material; also to freedom from defects, burrs, sharp edges, corners and points. The cleansing methods used shall not be injurious to any of the parts nor shall any of the parts be contaminated by the cleaning agents employed.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for inspection:

Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

SAE AS7974

4.1.1 Responsibility for compliance: All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements; however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspections:

The inspection requirements specified herein are classified as follows:

- a. Materials and design inspection (see 4.3).
- b. Qualification inspection (see 4.5).
- c. Quality conformance inspection (see 4.6).
 - 1. Individual tests (see 4.6.1).
 - 2. Sampling plan tests.
- d. Retention of qualification (see 4.6.3).

4.3 Materials and design inspection:

Materials and design inspection shall consist of certification that the materials and design used in fabricating the components, as listed in 3.4 through 3.5.4 are in accordance with the applicable referenced standards, specifications or requirements prior to such fabrication. This certification shall be supported by verifying data and shall be furnished with the report of qualification testing.

4.4 Inspection condition:

Unless otherwise specified, all inspections shall be made under the following room conditions:

Temperature	20-30°C (68-86°F)
Relative humidity	30-80%
Air pressure	600-800 millimeters mercury (23.62-31.5 inches mercury)

SAE AS7974

- 4.4.1 Test equipment and inspection facilities: Test equipment shall be of sufficient accuracy, quality and quantity to permit performance of the required inspection. The contractor shall establish calibration of inspection equipment to the satisfaction of the Government. Calibrations of the standards which control the accuracy of inspection equipment shall comply with the requirements of MIL-STD-45662. The inspection facilities shall be of sufficient size and appropriately staffed to accommodate typical production runs.
- 4.4.2 Inspection of packaging: Except when commercial packaging is specified, the sampling and inspection of the preservation and interior package marking shall be in accordance with groups A and B quality conformance inspection requirements of MIL-P-116. The sampling and inspection of the packing for shipment and storage shall be in accordance with the quality assurance provisions of the applicable container specification shown in section 5. The inspection of marking for shipment and storage shall be in accordance with MIL-STD-129. The inspection of commercial packaging shall be as specified in the contract (see 6.2).
- 4.5 Qualification inspection:
- Qualification inspection shall consist of the examinations and tests specified in Table II and applicable MS sheets or specification sheets (see 3.1). The tests performed in Table II shall be performed sequentially on the samples specified in 4.5.2. Failure of any sample shall stop the qualification program. The Qualifying Activity shall be notified of the failure and the required corrective actions. Testing cannot be resumed until authorized by the Qualifying Activity. The failure mode and corrective action must be documented in the Qualification Test Report or by separate addendum.
- 4.5.1 Qualification authorization: The supplier must be authorized to begin qualification inspection. Unauthorized qualification test data is not acceptable. A request for authorization to begin qualification inspection or periodic qualification inspection must be submitted to the Qualifying Activity (See 6.4).
- 4.5.2 Qualification test samples: The test sample size shall be two specimens of each type component being qualified, one of the two samples shall have the plug prepared for use as the structural integrity sample (see 3.6.9). The specimens shall be manufactured by the supplier's routine production process, and verified as such by the authorized government inspector. Any untested specimens required by the Qualifying Activity (see 4.5.3) must come from the same lot as the qualification test sample. Additional test samples shall be used for ozone test (see 4.7.18).
- 4.5.2.1 Attachable plugs: For qualification inspection, attachable plugs shall be crimped to cables to form cable assemblies 5 ± 0.1 ft. in overall length before being subjected to the inspections specified for attachable plugs in Table II. Clamping and identification banding is not required, but terminals must be crimped to the cable assembly. The cables shall be the size specified on the applicable MS drawing or specification sheet and shall meet the requirements of MIL-C-5756 (see 3.1). In addition, two crimp barrels for each wire size shall be supplied to the qualifying activity for verification of ability to be crimped with the standard tooling.

SAE AS7974

- 4.5.2.2 Cable assemblies: For qualification inspection, cable assemblies shall be 5 ± 0.1 ft. in overall length and be provided with two clamping bands 24 inches apart (location on cable optional) with the item identification band or sleeving located between them. Also terminals must be included on the cable assembly. When attachable plugs are used as part of the cable assembly, two crimp barrels for each wire size shall be supplied to the qualifying activity for verification of ability to be crimped with the standard tooling.
- 4.5.3 Forwarding of qualification submittal: Untested samples, as required, and the manufacturer's certified test reports shall be forwarded to the Qualifying Activity (see 6.4). The samples must be endorsed by the government inspector as representative samples of the manufacturer's normal production capability. Samples submitted without the endorsement will not be accepted.
- 4.6 Quality conformance inspection:
- Quality conformance inspection shall consist of the following:
- a. Individual inspection.
 - b. Sampling inspection.
- 4.6.1 Individual inspection: All cable assemblies produced under the contract shall be given an electrical continuity test to ensure correct connections between respective sockets and terminals, and shall be tested for dielectric conformance requirements of 4.7.7, except humidity. Reject any item that fails.
- 4.6.2 Sampling inspection: Sampling of items shall be in accordance with MIL-STD-105 inspection level II, AQL 1.0%. Each item of the sample shall be subjected to the applicable inspections as specified in Table II.
- 4.6.3 Retention of qualification: It shall be the responsibility of the qualified supplier to provide to the government periodic verification of ability of qualified products to meet the requirements of this specification. Periodic verification shall be performed at three year intervals and shall consist of Qualification Inspection tests except for structural integrity (see 4.7.17), mating forces following fluid immersion (see 4.7.3.3) and abrasion resistance (see 4.7.16). A summary of the quality conformance (sampling) tests shall also be submitted along with the test record. The summary shall include the numbers and type of any failures. Failure to furnish the summary may result in loss of qualification for that product.

SAE AS7974

TABLE II. Applicable qualification and quality conformance inspections.

Examination or test	Inspection paragraph number	Requirement paragraph number	Applicability (indicated by X)			
			Qualification inspections	Attach. plugs	Quality conformance 1/ (sampling) inspections	Attach. plug
Dimensions	4.7.1	3.3	X	X	X	X
Examination of product	4.7.2		X	X	X	X
Structural integrity	4.7.17	3.6.9	X	X		
Initial mating forces	4.7.3.2	3.6.3	X	X	X	
Mating forces following fluid immersion	4.7.3.3	3.6.3	X	X		
Force measurements for individual contacts (Attachable plug only)	4.7.3.4	3.6.3.3 & 3.6.3.4				X 3/
Impact following low temperature exposure	4.7.4	3.6.5	X	X		
Mating at low temperature	4.7.5	3.6.3.1	X	X		
Life flexing	4.7.6	3.4.4	X 2/	X 2/		
Dielectric strength following humidity exposure	4.7.7	3.6	X	X		
Voltage drop following salt spray	4.7.8	3.8	X	X	X	
Mating forces following current overload	4.7.9	3.6.3	X	X		
Cable attachment to plug	4.7.10	3.5.3	X	X		X
Cable attachment to lug terminal	4.7.11	3.6.6	X	X		
Plug static strength	4.7.12	3.6.3 & 3.6.4	X	X		
Plug bending strength	4.7.13	3.6.3	X	X		
Band tensile strength	4.7.14	3.4.2.1	X	X		
Misengagement	4.7.15	3.6.8	X	X		
Abrasion resistance	4.7.16	3.4.2 & 3.6.1	X	X		
Cable attachment to crimp barrel	4.7.11	3.6.6	X	X		
Zone resistance	4.7.18	3.6.11	X	X		

1/ See 4.6.1 for 100% individual inspections.

2/ One item from each sample.

3/ Attachable connectors with loose contacts.

SAE AS7974

4.7 Methods of inspection:

- 4.7.1 Dimensions: Items shall be measured for conformance to the dimensions shown on the MS drawing or specification sheet.
- 4.7.2 Examination of product: Items shall be examined as necessary to determine conformance to all requirements of this specification and of the standards for which there are no specific tests.
- 4.7.3 Mating forces: Both samples shall be tested in accordance with 4.7.3.2 for conformance with 3.6.3.
 - 4.7.3.1 Receptacles, engaging and disengaging force measurements: Inspection tests requiring the determination of the forces necessary to engage or disengage the plug with a receptacle shall be made using a pair of applicable, precision made "receptacle standards." The "receptacle standards" shall be manufactured with polished, unplated, stainless steel pins machined to ± 0.0005 inch of basic diameter shown on MS90362, securely attached to a 0.500 inch thick steel base. The distances between pin centers of one of the "receptacle standards" shall be within 0.001 inch of, but not smaller than, the smallest value permitted by MS90362 for the receptacle. The distances between the pin centers of the second "receptacle standard" shall be within 0.001 inch of, but not larger than, the largest values permitted by MS90362 for the receptacle. The transition between the spherical tip and the straight sides of the pins shall be a smooth tangent.
 - 4.7.3.2 Force values, engaging and disengaging force measurements: Force measurements shall be made using a tension/compression tester equipped with a means for measuring or recording lineal displacement versus force. The rate of movement shall be 8 ± 1 inch per minute. Unless otherwise noted, force measurements shall be made mating both receptacle standards (see 4.7.3.1) three times with each item. Record maximum readings. Force values shall be the average of the three maximum force readings. The above shall be repeated for disengagement. The average force value shall meet the specific test requirements for engagement and disengagement.
 - 4.7.3.3 Mating forces following fluid immersion: One sample item shall be immersed in oil which meets the requirements of MIL-L-23699. The second sample shall be immersed in fuel which meets the requirements of JP-4 fuel of MIL-T-5624. After 20 ± 1 hours of immersion, they shall be removed, wiped free of the fluids, and within 4 hours shall be tested in accordance with 4.7.3.2 for conformance to 3.6.3.
 - 4.7.3.4 Force measurements for individual contacts, attachable connectors only: Individual contacts for assembly to attachable plugs shall be tested with gage pin contacts described in 4.7.3.1 for conformance to 3.6.3.3 and 3.6.3.4.

SAE AS7974

- 4.7.4 Impact following low temperature exposure: Items shall be kept in a chamber maintained at $-55 \pm 2^{\circ}\text{C}$ for 24 ± 1 hours. Then, within 2 minutes upon removal from the cold chamber, each plug shall be tested by subjecting it to an impact of 20 ± 0.5 foot-pounds. The impact shall be applied downward to the plug through a steel, flat, horizontal surface, 3 inches x 3 inches x $1/4 \pm 1/64$ -inch. The plug shall then be turned over and three impacts shall be applied in a like manner to the other wider side. There shall be no damage to the plugs as a result of this test. Following the low temperature exposure, within 2 minutes upon removal from the test chamber, each band on cable assemblies shall be placed on a steel, flat, horizontal surface, 3 inches x 3 inches x $1/4 \pm 1/64$ -inch thick. An impact of 20 ± 0.5 foot-pounds shall be applied downward to the band through the flat steel surface. There shall be no damage to the bands as a result of this test.
- 4.7.5 Mating at low temperature: Items shall be kept in a chamber maintained at $-55 \pm 2^{\circ}\text{C}$ ($-67 \pm 3^{\circ}\text{F}$) for $6 \pm 1/4$ hours. Then, within 4 minutes upon removal from the cold chamber, the force required for the first engagement of each plug with a receptacle shall be determined. One item sample shall be mated once with one "receptacle standard." The other item sample shall be mated with the other "receptacle standard" (see 4.7.3.1). The engaging force shall not exceed the maximum values of 3.6.3.1 by more than 50 percent.
- 4.7.6 Life flexing: One item from each sample shall be flex tested while mated with a qualified receptacle with shield omitted. The receptacle shall be firmly fixed with the contacts oriented upward. The plug to be tested shall be mated to the receptacle with a $1/4 \pm 1/8$ inch gap maintained between the mating faces of the plug and receptacle. One end of a reciprocating arm, designed such that its travel is stopped in each direction as a prescribed force is reached, shall be firmly clamped to a point on the cable $3 \pm 1/2$ inches from the rear of the connector in such a manner as to be perpendicular to the axis of the plug and to flex the plug alternately toward each of the two wider faces. The free (terminal lug) end of the cable shall be supported upward to prevent interference with the test fixture. A six-socket plug shall be flexed with a 20 ± 2 pound force; a three socket plug with a 10 ± 2 pound force. The plug shall be flexed at a rate of 10 ± 5 cycles per minute for a total of 10,000 cycles. A cycle is described as the movement from the normal vertical condition, to both sides, and return. There shall be no damage to the plug or any conductor within the plug as a result of this test, which would prevent compliance with the following inspection tests.

SAE AS7974

4.7.7 Dielectric strength following humidity exposure: Items shall be subjected to the Moisture Resistance Test of Method 106 from MIL-STD-202, except steps 7a and 7b are not required. After the tenth and final cycle, the chamber shall be maintained at the end-of-cycle conditions until the items are removed for dielectric strength tests to be conducted in accordance with MIL-STD-202, Method 301. The following conditions shall exist:

- a. Each item shall be tested immediately upon removal from the humidity chamber.
- b. The items shall not be wiped but may be hand shaken briefly to remove puddled water.
- c. The test potential shall be 2000 volts DC.
- d. The potential shall be applied between each terminal and all other terminals together and then between all terminals together and all other exposed metal parts together (except the sockets). Internally jumpered control sockets are to be considered one terminal.

A current leakage in excess of 1.0 milliampere shall be cause for rejection.

4.7.8 Voltage drop following salt spray: Items shall be subjected to the salt spray test of MIL-STD-202, Method 101, Condition A for 48 hours. They shall then be mated with a qualified receptacle and connected to a power supply and circuitry as needed to pass the test current specified in Table III through each applicable plug socket simultaneously. The following conditions shall exist:

- a. The salt solution concentration shall be 5 percent.
- b. The applicable test currents shall be applied after the first mating of the item with a receptacle following the salt spray exposure.
- c. The voltage drops shall be noted at the end of a 5 minute test current application. The voltage drop shall be measured from the end of each contact on the rear of the receptacle to a point on each corresponding wire of the cable assembly within an inch from the rear of the connector. The point shall be obtained by piercing the insulation with a sharp needle prod. The voltage drop of internally jumpered small sockets shall be measured between the end of the corresponding receptacle contacts. Puncturing cable insulation to accomplish this test is nondestructive.

No voltage drop shall exceed the value specified in Table III.

SAE AS7974

TABLE III. Allowable voltage drop.

Contact size	Test current (Amps)	Max allowable voltage drop (millivolts)
12	15	30
8	45	30
4	150	40
2	200	45
0	250	45
00	300	45
0000	400	45

- 4.7.9 Mating forces following current overload: Items shall be mated with a qualified receptacle and connected to a power supply and circuitry as needed to pass the 3-minute current overload rating of Table IV through each large socket simultaneously.

TABLE IV. Current overload ratings.

Contact size	3-minute current (Amp)
4	330
2	460
0	600
00	700
0000	1000

While and after the overloads have been applied, there shall be no shorting or loss of continuity, burning, rupture or other damage to the item preventing satisfactory completion of the tests. Smoking shall not be cause for failure if performance is not impaired. After cooling to ambient temperature, the items shall be tested for conformance to 3.6.3.

- 4.7.10 Cable attachment to plug: Items shall be tested by applying a tensile force between the rear of the plug body and a point on each conductor (except control leads if used) of the cable assembly. The test fixture supporting the rear of the plug shall not support any internal parts of the plug. The test fixture supporting the conductor shall be securely clamped at a point between the first band and the rear of the plug. The force shall be 100 ±5 pounds. There shall be no damage to the items as a result of this test.

SAE AS7974

- 4.7.11 Cable attachment to lug terminal and crimp barrel: Items shall be tested by applying a tensile force between each lug terminal or crimp barrel and cable of the cable assembly. A standard tensile testing machine shall be used to apply sufficient force to pull the wire out of the lug terminal or crimp barrel, or break the wire, or break the lug terminal or crimp barrel. The mechanical connection of the wire to the lug terminal or crimp barrel shall not break or become distorted to the extent that it is unfit for further use before the minimum tensile strengths, as specified in Table V, are reached. The tests shall be made with a speed of head travel of 1 inch per minute. The holding surfaces of the tensile machine clamp may be serrated to provide sufficient gripping or holding strength.

TABLE V. Lug terminal and crimp barrel crimp strength requirement.

Crimp barrel and terminal lug size (AWG)	Minimum strength (pounds)
12	110
8	225
4	400
2	550
0	700
00	750
0000	875

- 4.7.12 Plug static strength: Plugs shall be mounted on a flat surface and shall be tested by applying a force of 1000 ± 50 pounds to the wider sides of plugs. The force shall be applied evenly across the entire side. There shall be no damage to the plugs as a result of this test. After this test, the plugs shall be tested for conformance with engaging and disengaging forces (see 3.6.6 and 4.7.3.3).
- 4.7.13 Plug bending strength: Each six-socket plug to be tested shall be mated with a qualified receptacle which has been secured in a fixture so the axis of its pins are horizontal. A 64 ± 3 pound weight shall be suspended for five minutes minimum, at the mid-point $\pm .25$ inch of the plug length with the force applied evenly across the side. The weight shall then be removed and the plug/receptacle rotated about its axis so that the weight may be similarly applied first to the opposite side and then to the remaining sides. A force of 32 ± 1.5 pounds shall be similarly applied to three-socket plugs. There shall be no damage to the plugs as a result of this test. The plug shall then meet the requirements of engaging and disengaging forces (see 3.6.6 and 4.7.3.3).

SAE AS7974

- 4.7.14 Band tensile strength: The cable assemblies shall be kept in a chamber maintained at $71^{\circ} \pm 2^{\circ}\text{C}$ for $6 \pm 1/4$ hours. Then, within 5 minutes upon removal from the chamber, the conductors of the cables (between the two bands) shall be divided into two groups as nearly equal as possible and a force of 300 ± 15 pounds, tending to pull the two groups apart, shall be applied at a rate of 12 inches per minute. Upon reaching 300 ± 15 pounds, this tension shall be held for 2.0 seconds minimum before being released. After this test, the bands shall meet the requirements of 3.4.2.1.
- 4.7.15 Misengagement: Items shall be tested by rotating the plug 180° from the orientation of the mating receptacle and applying a mating force of 150 ± 10 pounds. There shall be no electrical contact of the small plug sockets with any of the receptacle pins.
- 4.7.16 Abrasion resistance: The abrasion resistance of the cable band and plug body materials shall be tested by the manufacturer for conformance to the requirements of 3.4.2 and 3.6.1 and the results included in the manufacturer's test report.
- 4.7.17 Structural integrity: One item from each sample shall have the portions of the plug ground away as indicated in 3.6.9 and be subjected to all tests except as noted in 3.6.9. The grinding away of the plug sample shall follow the examination of product for qualification testing and pass all requirements.
- 4.7.18 Ozone resistance: Two test samples shall be required for ozone testing. The cable assembly specimens shall be prepared from the finished cable by removing all but 12 ± 1 inches of cable from the rear of the molded on plug. The attachable plug specimens shall consist of the entire attachable plug. The specimens shall be at room ambient for at least one week before sample preparation. One test sample shall be tested for ozone resistance after heat aging and the other one shall be tested unaged. The heat aging shall be at $158^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($70^{\circ}\text{C} \pm 3^{\circ}\text{C}$) for 70 ± 5 hours and the specimens shall then be kept at room ambient for at least four days after removal from the aging oven and previous to the ozone test. The ozone test shall be conducted in accordance with ASTM D1149 except the chamber temperature shall be $100^{\circ}\text{F} \pm 2^{\circ}\text{F}$ ($38^{\circ}\text{C} \pm 1^{\circ}\text{C}$), the ozone concentration shall be 50 ± 3 parts per hundred million parts of air, and the exposure time shall be 168 ± 1 hours. At the end of the exposure, the mounted specimens shall be removed from the chamber and allowed to cool to room temperature. The specimens shall be examined for cracks in the jacket or insulating materials under a seven power optical magnifier.

SAE AS7974

5. PACKAGING:

5.1 Preservation and packaging:

Preservation and packaging shall be Level A or C as specified by the contracting activity (see 6.2).

5.1.1 Level A:

5.1.1.1 Cable assemblies: Cable assemblies shall be preserved and packaged in accordance with MIL-P-116, Method III. Each cable assembly, appropriately cleaned, shall be coiled in a uniform, compact fashion. The coil shall have sufficient diameter to prevent creases or deformation. Each coil shall be secured with a minimum of three ties (using a suitable fiber tape) equidistantly spaced around the coil. The plug shall then be enclosed within a polyethylene bag, fabricated of film conforming to L-P-378, Type I minimum thickness of 0.004 inch. Dunnage in the form of a corrugated fiberboard sleeve shall be used to convert the item to a Type 2 load. The dimensions of the sleeve shall be approximately the same as the inside of the container. The cable assembly shall then be packed within a close fitting fiberboard box conforming to PPP-B-636, class weather resistant Grade V3s/V3c as a minimum. The container closure, sealing and banding shall be accomplished in accordance with the appendix to the specification.

5.1.1.2 Attachable plugs: Attachable plugs shall be individually preserved in accordance with MIL-P-116, Method IC-3. Each plug, appropriately cleaned, shall be cushioned with a minimum of one-half inch of material conforming to PPP-C-843. The bagged attachable plug shall then be packed within a close fitting fiberboard box conforming to PPP-B-636, Style OPF, Class - Domestic, Grade 125. The closure shall be accomplished in accordance with the appendix to the specification.

5.1.2 Level C:

5.1.2.1 Cable assemblies and attachable plugs: Cable assemblies and attachable plugs shall be preserved in a manner that will prevent physical damage and deterioration during transit from the supply source to the shipping point. The contractor's commercial practice may be utilized when it conforms to the criteria specified herein.

5.2 Packing:

Packing shall be Level A, B or C as specified (see 6.2). Insofar as practicable, shipping containers shall effect a close fit, contain identical quantities and be of uniform dimensional configuration.

SAE AS7974

- 5.2.1 Level A: Cable assemblies, preserved as specified in 5.1.1.1, shall not require overpacking for shipment. Attachable plugs, preserved as specified in 5.1.1.2, shall be packed for shipment in fiberboard containers conforming to PPP-B-636, Class-Weather-Resistant, Grade V3s/V3c (minimum). The gross weight limitation of each packed container and the closure, sealing and banding shall be accomplished in accordance with the appendix to the specification.
- 5.2.2 Level B: Cable assemblies, preserved as specified in 5.1.1.1, shall not require overpacking for shipment. Attachable plugs, preserved as specified in 5.1.2, shall be packed for shipment in fiberboard containers conforming to PPP-B-636, Class-Domestic, Grade 200 (minimum). The gross weight limitation of each packed container shall be in accordance with the appendix to the specification.
- 5.2.3 Level C: Cable assemblies preserved as specified in 5.1.1.1, shall not require overpacking for shipment. Attachable plugs preserved as specified in 5.1.2, shall be packed for shipment in a manner that will afford protection against damage during transit from the supply source to the shipping point. The pack shall, as a minimum, comply with the rules and regulations applicable to the mode of transportation utilized.

5.3 Assembly instructions for attachable plugs:

Step-by-step instructions for replacing a damaged plug shall be packaged with each attachable plug. The instructions shall include the following information:

- a. An exploded assembly view of the new plug with each part clearly identified by name.
- b. The proper method of removing the damaged plug.
- c. Preparation of the cable for a new plug.
- d. Instructions for identifying the proper plug to use for a specific wire size.
- e. Instructions for attaching the new plug, including proper crimping techniques.
- f. Instructions for post-assembly continuity tests to verify proper matching of conductors and plug sockets.

The instructions shall be of sufficient detail and clarity so that inexperienced personnel can repair a cable assembly making it capable of passing the applicable test requirements of this specification.

5.4 Marking:

In addition to any special marking required by the contract or order, unit packages, intermediate packages, and shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES:

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use:

The cable covered by this specification are intended for installation on airfields and ground power carts. They are to be plugged into external power receptacles on aircraft to connect the aircraft to external sources of electric power. The attachable plugs covered by this specification are intended for installation on the cables covered by this specification and to replace the original plugs on the cables when they become damaged or worn out. Air Force specific use shall be as identified in 1.3.1 and 1.3.2.

6.2 Acquisition requirements:

Acquisition documents must specify the following:

- a. Title, number and date of this specification.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2).
- c. The number(s), including the latest revision letter, if any, the date and title of the MS standard for the item(s) being ordered.
- d. The MS part number(s) and quantity of the item(s) being ordered.
- e. The levels of preservation and packing and the quantity of the unit package desired.

6.3 Subject term (keyword) listing:

Cable, power
Contacts, socket
Plugs, integrally, molded
Plug, molded
Terminals

SAE AS7974

6.4 Qualification:

With respect to products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in the applicable Qualified Products List (QPL), whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification.

- 6.4.1 Application for qualification: The activity responsible for the QPL for MIL-C-7974 is the Naval Air Systems Command. The Naval Avionics Center, Indianapolis, IN, has been designated by the Naval Air Systems Command as agent for the establishment of the QPL and retention of qualification. Requests for information pertaining to and applications for qualification should be addressed to the Naval Avionics Center, Code 444, 6000 East 21st Street, Indianapolis, IN 46219-2189.
- 6.4.2 Resubmission of qualification samples: In case of failure of the sample or samples submitted, consideration will be given to the request of the manufacturer for additional tests only after it has been clearly shown that changes have been made in the product which the qualifying activity considers sufficient to warrant additional tests.

6.5 Definitions:

The following definitions apply to this specification:

- a. Attachable plug: A plug which is a discrete item attached to cable or conductors by means of crimped wire contacts. A means of sealing the conductor insulation or cable jacket is also provided.
- b. Cable: A cable consists of a single conductor with either the insulation separate or combined with the cable jacket or two or more individually insulated conductors contained in a common jacket.
- c. Cable assembly: A cable or a group of conductors with a connector on one or both ends.
- d. Contact: A conductive element in a connector which mates with a corresponding element to provide an electrical connection.
- e. Crimp barrel: The metal sleeve portion of a crimp (solderless) contact designed to accept the wire.

SAE AS7974

6.5 (Continued):

- f. Integrally molded plug: A connector which is molded on the end of a cable or cables. The resultant plug is a homogeneous mass which is bonded to the connector components, contacts and cable.
- g. Lead copper: A series of cast copper alloys including 20% or more lead, and usually a small amount of silver, but without tin or zinc. Lead copper has the characteristics of high conductivity, machineability and corrosion resistance.
- h. Socket contact: A female contact designed to mate to a male or pin contact. It is normally connected to the "line" side of a circuit.
- i. Tellurium copper: A series of copper alloys with .3% to .7% tellurium and some phosphorus. Tellurium copper has the characteristics of excellent solderability, machineability, high conductivity and resistance to corrosion.
- j. Wire: A wire is a single-insulated, stranded copper conductor without metallic covering, shielding or jacketing.

6.6 Mating receptacle:

Specifications for mating receptacles are in MIL-C-81790, including receptacles which were previously listed herein.

6.7 International standardization agreement:

Certain provisions of this specification are the subject of international standardization agreements (ASCC AIR STD 12/6, ASCC AIR STD 12/7, STANAG 3302 and STANAG 3303). When amendment, revision or cancellation of this specification is proposed which will affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels including departmental standardization offices, if required.

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APPENDIX A

CONNECTOR CROSS REFERENCE AND SUPERSESSION DATA

10. SCOPE:

10.1 Scope:

This appendix cross references electric connector receptacles found on aircraft with electric plug connectors, and associated cables, used on ground support equipment. MIL-C-81790 receptacles are intended to connect the aircraft to external power assemblies. MIL-C-7974 references the cable assemblies and plugs used on aircraft ground support equipment. Plugs, cables and receptacles are matched to ground support equipment. Plugs, cables and receptacles are matched to meet their power rating and application 28 volt DC jet starting power, 28 volt DC operating power and 115/200 volt, 400 Hertz external power. Also included is MIL-C-7974 military standard and specification sheet part number supersession or current status.

20. APPLICABLE DOCUMENTS (Not Applicable):

30. REQUIREMENTS:

30.1 Connector cross reference (Table A-I):

The aircraft external power receptacle is listed by application, i.e., 28 volt DC operating power, 28 volt DC jet engine starting and 115/200 volt, 400 Hertz with the corresponding plug and cable assembly. NOTE: The attachable plug may be a molded plug when used as a cable assembly.

30.2 Connector plug and cable assembly cross reference (Table A-II):

The ground power electric connector plug is listed by application, i.e., 115/200 volt, 400 Hertz, 28 volt DC Jet Starting, and 28 volt, operating power, with the corresponding cable assembly. NOTE: The attachable plug may be a molded-on plug when used as a cable assembly.

30.3 Connector plug and cable assembly part number supersession data:

The MIL-C-7974 military standard and specification sheet part number supersession or current status is listed in Table A-III for MS21378, MS24121, MS24122, MS24208, MS25019, MS25486, MS25487, MS25488, MS90328, MS90347, MIL-C-7974/1 and MIL-C-7974/2.

SAE AS7974

TABLE A I. Connector cross reference.

MIL-C-81790 to MIL-C-7974

MIL-C-81790 Connectors, Receptacle, External Electric Power, Aircraft		MIL-C-7974C Cable Assemblies and Attachable Plugs, External Electric Power, Aircraft	
NUMBER	DESCRIPTION	NUMBER	DESCRIPTION
MS3506	Connector, Receptacle, External Electric Power, Aircraft, 28 Volt DC, Operating Power	MS24121	Wiring Harness, Single Point Refueling
		MS25488	Connector, Plug, Attachable, External Electric Power, Aircraft, 28 Volt DC, Operating Power
		MS90347	Cable Assembly, External Electric Power, Aircraft, 28 Volt DC, Operating Power
MS25018	Connector, Receptacle, External Electric Power, Aircraft, 28 Volt DC, Jet Starting	MS25019	Cable Assembly, External Electric Power, Aircraft, 28 Volt DC, Jet Starting
		MS25487	Connector, Plug, Attachable External Electric Power, Aircraft, 28 Volt DC, Jet Starting
MS90362	Connector, Receptacle, External Electric Power, Aircraft, 115/200 Volt, 400 Hertz	MS24122	Wiring Harness, External Power, 115 Volt AC, Single Phase
		MS24208	Cable and Plug Assembly, External Power, 115/200 3 Phase, Single Point Refueling
		MS25486	Connector, Plug, Attachable, External Electric Power, Aircraft, 115/200 Volt, 400 Hertz
		MS90328	Cable Assembly, External Electric Power, Aircraft, 115/120 Volt, 400 Hertz
		MIL-C-7974/1	Connector, Plug, Aircraft, External Power (for 115/200 Volt, 400 Hertz)

SAE AS7974

TABLE A I. Connector cross reference (continued).

MIL-C-81790 to MIL-C-7974

MIL-C-81790 Connectors, Receptacle, External Electric Power, Aircraft		MIL-C-7974C Cable Assemblies and Attachable Plugs, External Electric Power, Aircraft	
NUMBER	DESCRIPTION	NUMBER	DESCRIPTION
MS90362		MIL-C-7974/2	Cable Assembly, External Power, Aircraft, 115/200 Volt, 400 Hertz Power Distribution Flight Line (for A/E 24A-166A)
MS21379	Connector, Receptacle, External Power, Air- craft, 230/400 Volt, 400 Hz	MS21378	Plugs and Cable Assemblies, External Power, Aircraft, 230/400 Volt, 400 Hertz

SAE AS7974

TABLE A II. Connector plug and cable assembly.

Cross Reference MIL-C-7974C

Connector, Plug, Attachable		Cable Assembly With Attachable or Molded On Plug	
NUMBER	DESCRIPTION	NUMBER	DESCRIPTION
MS25486	Connector, Plug, Attachable, External Electric Power, Aircraft, 115/200 Volt, 400 Hertz	MS90328	Cable Assembly, External Electric Power, Aircraft 115/200 Volt, 400 Hertz
MIL-C-7974/1	Connector, Plug, Aircraft, External Power (for 115/200 Volt, 400 Hertz)	MIL-C-7974/2	Cable, Assembly, External Power, Aircraft 115/200 Volt, 400 Hertz, Power Distribution Flight Line (for A/E 24A-166A)
MS25487	Connector, Plug, Attachable, External Electric Power, Aircraft, 28 Volt, DC Jet Starting	MS25019	Cable Assembly, External Electric Power, Aircraft, 28 Volt, DC Jet Starting
MS25488	Connector, Plug, Attachable, External Electric Power, Aircraft, 28 Volt DC Operating Power	MS90347	Cable Assembly, External Electric Power, Aircraft, 28 Volt DC Operating Power

SAE AS7974

TABLE A III

MS21378A, Plugs and Cable Assemblies, External Power,
Aircraft 230/400 Volt, 400 Hertz, dated 28 November 1984:

MS Part Number	Item Name	Plug Type	A, B, C, N Wire Size	Length in Feet ± 0.5	Supersedes	Current Status
MS21378-8	Output Cable	Molded Female	0	110	None	Current Part Number
MS21378-12	Output Cable	Molded Female	00	25	None	Current Part Number
MS21378-15	Output Cable	Molded Female	00	60	None	Current Part Number
MS21378-21	Extension Cable	Molded Male & Female	0	75	None	Current Part Number
MS21378-30	Attachable Replacement Plug	Female	0	--	None	Current Part Number
MS21378-31	Attachable Replacement Plug	Male	0	--	None	Current Part Number
MS21378-32	Attachable Replacement Plug	Female	00	--	None	Current Part Number
MS21378-35	Molded Replacement Plug	Female	0	42.0 \pm 2.0 in.	None	Current Part Number
MS21378-36	Molded Replacement Plug	Male	0	42.0 \pm 2.0 in.	None	Current Part Number
MS21378-37	Molded Replacement Plug	Female	00	42.0 \pm 2.0 in.	None	Current Part Number

TABLE A III (continued)

MS24121A, Wiring Harness, Single Point Refueling, Dated 10 July 1956:

MS Part Number	Item Name	Wire Size	Length in Feet +2 Inches	Supersedes	Current Status
MS24121-1	Wiring Harness	2	60	None	Current Part Number

MS24122C, Wiring Harness, External Power, 115 Volt AC, Single Phase, Dated 28 July 1986:

MS Part Number	Item Name	Wire Size	Length in Feet +2 Inches	Supersedes	Current Status
MS24122-1	Wiring Harness	2	20	None	Current Part Number
MS24122-2	Wiring Harness	2	30	None	Current Part Number
MS24122-3	Wiring Harness	2	40	None	Current Part Number
MS24122-4	Wiring Harness	2	60	None	Current Part Number
MS24122-5	Wiring Harness	1/0	20	None	Current Part Number
MS24122-6	Wiring Harness	1/0	30	None	Current Part Number
MS24122-7	Wiring Harness	1/0	40	None	Current Part Number
MS24122-8	Wiring Harness	1/0	60	None	Current Part Number

TABLE A III (continued)

MS24208D, Cable and Plug Assembly, External Power, 115/200 Volts,
3 Phase, Single Point Refueling, Dated 28 July 1986:

MS Part Number	Item Name	Wire Size	Length in Feet +2 Inches	Supersedes	Current Status
MS24308-1	Cable Assembly	12	60	None	Part Number not defined in MS sheet

MS25019G, Cable Assembly Jet Starting Power, Dated 31 August 1978:

MS Part Number	Item Name	Wire Sizes Positive Negative Control	Length in Feet +0.5	Supersedes	Current Status
MS25019-1	Cable Assembly	0000 0000	120	None	Cancelled 28 June 1957
MS25019-2	Cable Assembly	0000 0000	240	None	Cancelled 28 June 1957
MS25019-3	Cable Assembly	0000 0000	360	None	Cancelled 28 June 1957
MS25019-2A	Cable Assembly	0000 0000	240	None	Cancelled 28 June 1957
MS25019-3A	Cable Assembly	0000 0000	360	None	Cancelled 28 June 1957
MS25019-2B	Cable Assembly	0000 0000	240	None	Superseded by MS25019-20
MS25019-3B	Cable Assembly	0000 0000	360	None	Superseded by MS25019-30
MS25019-20	Cable Assembly	0000 0000	20	MS25019-2B & MS25487-20	Current Part Number
MS25019-30	Cable Assembly	0000 0000	30	MS25019-3B & MS25487-30	Current Part Number
MS25019-40	Cable Assembly	0000 0000	40	MS25487-40	Current Part Number

TABLE A III (continued)

MS25019G, Cable Assembly Jet Starting Power, Dated 31 August 1978:

MS Part Number	Item Name	Wire Sizes Positive Negative Control	Length in Feet +0.5	Supersedes	Current Status
MS25019-60	Cable Assembly	0000 0000 8	60	MS25487-60	Current Part Number
MS25019-80	Cable Assembly	0000 0000 8	80	MS25487-80	Current Part Number
MS25019-100	Cable Assembly	0000 0000 8	100	MS25487-100	Current Part Number

MS25486G, Connector, Plug, Attachable, External Electric Power, Aircraft, 115/200 Volt, 400 Hertz, dated 8 January 1982:

MS Part Number	Item Name	A, B, C, N Wire Size	Length in Feet +0.5	Supersedes	Current Status
MS25486-1	Attachable plug	0	--	MS25487-7	Superseded by MS25486-16
MS25486-2	Attachable Plug	0	--	MS25487-8	No available supersession data
MS25486-3	Attachable Plug	00	--	None	Superseded by MS25486-17
MS25486-4	Cable Assembly	0	20	AN3430-3, MS90328-1	Superseded by MS90328-13
MS25486-5	Cable Assembly	0	30	AN3430-6, MS90328-2	Superseded by MS90328-14
MS25486-6	Cable Assembly	0	40	AN3430-4, MS90328-3	Superseded by MS90328-15
MS25486-7	Cable Assembly	0	60	MS90328-4	Superseded by MS90328-16
MS25486-8	Cable Assembly	0	80	MS90328-9	Superseded by MS90328-17
MS25486-9	Cable Assembly	0	100	MS90328-10	Superseded by MS90328-18

SAE AS7974

TABLE A III (continued)

MS254866, Connector, Plug, Attachable, External Electric Power,
Aircraft, 115/200 Volt, 400 Hertz, dated 8 January 1982:

MS Part Number	Item Name	A, B, C, N Wire Size	Length in Feet +0.5	Supersedes	Current Status
MS25486-10	Cable Assembly	00	20	MS90328-5	Superseded by MS90328-19
MS25486-11	Cable Assembly	00	30	MS90328-6	Superseded by MS90328-20
MS25486-12	Cable Assembly	00	40	MS90328-7	Superseded by MS90328-21
MS25486-13	Cable Assembly	00	60	MS90328-8	Superseded by MS90328-22
MS25486-14	Cable Assembly	00	80	MS90328-11	Superseded by MS90328-23
MS25486-15	Cable Assembly	00	100	MS90328-12	Superseded by MS90328-24
MS25486-16	Attachable Plug	0	--	MS25486-1, MS25487-7	Current Part Number
MS25486-17	Attachable Plug	00	--	MS25486-3	Current Part Number
MS25486-18	Cable Assembly	0	20	AN3430-1A	Not for Navy use, superseded by MS90328-25
MS25486-19	Cable Assembly	0	30	AN3430-5	Not for Navy use, superseded by MS90328-26
MS25486-20	Cable Assembly	0	40	AN3430-2A	Not for Navy use, superseded by MS90328-27
MS25486-21	Cable Assembly	0	60	AN3430-7	Not for Navy use, superseded by MS90328-28
MS25486-22	Cable Assembly	0	80	None	Not for Navy use, superseded by MS90328-29

TABLE A III (continued)

MS25486G, Connector, Plug, Attachable, External Electric Power,
Aircraft, 115/200 Volt, 400 Hertz, dated 8 January 1982:

MS Part Number	Item Name	A, B, C, N Wire Size	Length in Feet +0.5	Supersedes	Current Status
MS25486-23	Cable Assembly	0	100	None	Not for Navy use, superseded by MS90328-30
MS25486-24	Cable Assembly	00	20	None	Not for Navy use, superseded by MS90328-31
MS25486-25	Cable Assembly	00	30	None	Not for Navy use, superseded by MS90328-32
MS25486-26	Cable Assembly	00	40	None	Not for Navy use, superseded by MS90328-33
MS25486-27	Cable Assembly	00	60	None	Not for Navy use, superseded by MS90328-34
MS25486-28	Cable Assembly	00	80	None	Not for Navy use, superseded by MS90328-35
MS25486-29	Cable Assembly	00	100	None	Not for Navy use, superseded by MS90328-36
MS25486-30	Attachable Plug	0	--	None	Not for Navy use, current Part Number
MS25486-31	Attachable Plug	00	--	None	Not for Navy use, current Part Number

TABLE A III (continued)

MS25487G, Connector, Plug, Attachable External Electric Power,
Aircraft 28 Volt DC, Jet Starting, Dated 23 May 1976:

MS Part Number	Item Name	Wire Size Large Sockets Small Sockets	Length in Feet +0.5	Supersedes	Current Status
MS25487-1	Attachable Plug	N/A	--	None	Superseded by MS25487-10
MS25487-2	Attachable Plug	N/A	--	MS25487-1	Superseded by MS25487-10
MS25487-20 (-3)*	Cable Assembly	0000	20	MS25019-2B	Superseded by MS25019-20
MS25487-30 (-4)*	Cable Assembly	0000	30	MS25019-3B	Superseded by MS25019-30
MS25487-40 (-5)*	Cable Assembly	0000	40	None	Superseded by MS25019-40
MS25487-60 (-6)*	Cable Assembly	0000	60	None	Superseded by MS25019-60
MS25487-80 (-7)*	Cable Assembly	0000	80	None	Superseded by MS25019-80
MS25487-100 (-8)*	Cable Assembly	0000	100	None	Superseded by MS25019-100
MS25487-9	Attachable Plug	0000	--	MS25487-1, -2	Superseded by MS25487-10
MS25487-10	Attachable Plug	0000	--	MS25487-1, -2 & -9	Current Part Number

*Indicates that these dash numbers were erroneously assigned during the MS25487, Revision C coordination.

TABLE A III (continued)

MS25488F, Connector Plug, Attachable, External Power, Aircraft,
28 Volt DC Operating Power, Dated 8 September 1987:

MS Part Number	Item Name	Wire Size	Length in Feet +0.5	Supersedes	Current Status
MS25488-1	Attachable Plug	N/A	--	None	Superseded by MS25488-2
MS25488-2	Attachable Plug	N/A	--	MS25487-3	Superseded by MS25488-25
MS25488-3	Attachable Plug	N/A	--	MS25487-4	Superseded by MS25488-26
MS25488-4	Attachable Plug	N/A	--	MS25487-5, MS25488-1	Superseded by MS25488-27
MS25488-5	Attachable Plug	N/A	--	MS25487-6	Superseded by MS25488-24
MS25488-6	Cable Assembly	0	20	AN255TC20, MS90347-1	Superseded by MS90347-7
MS25488-7	Cable Assembly	0	30	AN255TC30, MS90347-2	Superseded by MS90347-8
MS25488-8	Cable Assembly	0	40	None	Superseded by MS90347-9
MS25488-9	Cable Assembly	0	60	None	Superseded by MS90347-10
MS25488-10	Cable Assembly	0	80	None	Superseded by MS90347-11
MS25488-11	Cable Assembly	0	100	None	Superseded by MS90347-12
MS25488-12	Cable Assembly	00	20	AN255TD20, MS90347-3	Superseded by MS90347-13
MS25488-13	Cable Assembly	00	30	AN255TD30, MS90347-4	Superseded by MS90347-14
MS25488-14	Cable Assembly	00	40	None	Superseded by MS90347-15
MS25488-15	Cable Assembly	00	60	None	Superseded by MS90347-16
MS25488-16	Cable Assembly	00	80	None	Superseded by MS90347-17

TABLE A III (continued)

MS25488F, Connector Plug, Attachable, External Power, Aircraft,
28 Volt DC Operating Power, Dated 8 September 1987:

MS Part Number	Item Name	Wire Size	Length in Feet +0.5	Supersedes	Current Status
MS25488-17	Cable Assembly	00	100	None	Superseded by MS90347-18
MS25488-18	Cable Assembly	0000	20	AN2551E20, MS90347-5	Superseded by MS90347-19
MS25488-19	Cable Assembly	0000	30	AN2551E30, MS90347-6	Superseded by MS90347-20
MS25488-20	Cable Assembly	0000	40	None	Superseded by MS90347-21
MS25488-21	Cable Assembly	0000	60	None	Superseded by MS90347-22
MS25488-22	Cable Assembly	0000	80	None	Superseded by MS90347-23
MS25488-23	Cable Assembly	0000	100	None	Superseded by MS90347-24
MS25488-24	Attachable Plug	2	--	MS25488-5	No available supersession data
MS25488-25	Attachable Plug	0	--	MS25488-2	Current Part Number
MS25488-26	Attachable Plug	00	--	MS25488-3	Current Part Number
MS25488-27	Attachable Plug	0000	--	MS25488-1, -4	Current Part Number

SAE AS7974

TABLE A III (continued)

MS90328F, Cable Assembly, External Electric Power, Aircraft,
115/200 Volt, 400 Hertz, Dated 17 April 1981:

MS Part Number	Item Name	A, B, C, N Wire Size	Length in Feet +0.5 -0.5	Supersedes	Current Status
MS90328-1	Cable Assembly	0	20	AN3430-3	Superseded by MS90328-13
MS90328-2	Cable Assembly	0	30	AN3430-6	Superseded by MS90328-14
MS90328-3	Cable Assembly	0	40	AN3430-4	Superseded by MS90328-15
MS90328-4	Cable Assembly	0	60	None	Superseded by MS90328-16
MS90328-5	Cable Assembly	00	20	None	Superseded by MS90328-19
MS90328-6	Cable Assembly	00	30	None	Superseded by MS90328-20
MS90328-7	Cable Assembly	00	40	None	Superseded by MS90328-21
MS90328-8	Cable Assembly	00	60	None	Superseded by MS90328-22
MS90328-9	Cable Assembly	0	80	None	Superseded by MS90328-17
MS90328-10	Cable Assembly	0	100	None	Superseded by MS90328-18
MS90328-11	Cable Assembly	00	80	None	Superseded by MS90328-23
MS90328-12	Cable Assembly	00	100	None	Superseded by MS90328-24
MS90328-13	Cable Assembly	0	20	AN3430-3, MS90328-1 & MS25486-4	Current Part Number
MS90328-14	Cable Assembly	0	30	AN3430-6, MS90328-2 & MS25486-5	Current Part Number

TABLE A III (continued)

MS90328F, Cable Assembly, External Electric Power, Aircraft,
115/200 Volt, 400 Hertz, Dated 17 April 1981:

MS Part Number	Item Name	A, B, C, N Wire Size	Length in Feet +0.5	Supersedes	Current Status
MS90328-15	Cable Assembly	0	40	AN3430-4, MS90328-3 & MS25486-6	Current Part Number
MS90328-16	Cable Assembly	0	60	AN3430-8, MS90328-4 & MS25486-7	Current Part Number
MS90328-17	Cable Assembly	0	80	MS90328-9 & MS25486-8	Current Part Number
MS90328-18	Cable Assembly	0	100	MS90328-10 & MS25486-9	Current Part Number
MS90328-19	Cable Assembly	00	20	MS90328-5 & MS25486-10	Current Part Number
MS90328-20	Cable Assembly	00	30	MS90328-6 & MS25486-11	Current Part Number
MS90328-21	Cable Assembly	00	40	MS90328-7 & MS25486-12	Current Part Number
MS90328-22	Cable Assembly	00	60	MS90328-8 & MS25486-13	Current Part Number
MS90328-23	Cable Assembly	00	80	MS90328-11 & MS25486-14	Current Part Number
MS90328-24	Cable Assembly	00	100	MS90328-12 & MS25486-15	Current Part Number
MS90328-25	Cable Assembly	0	20	AN3430-1A & MS25486-18	Inactive for new design
MS90328-26	Cable Assembly	0	30	AN3430-5 & MS25486-19	Inactive for new design
MS90328-27	Cable Assembly	0	40	AN3430-2A & MS25486-20	Inactive for new design
MS90328-28	Cable Assembly	0	60	AN3430-7 & MS25486-21	Inactive for new design
MS90328-29	Cable Assembly	0	80	MS25486-22	Inactive for new design

TABLE A III (continued)

MS90328F, Cable Assembly, External Electric Power, Aircraft,
115/200 Volt, 400 Hertz, Dated 17 April 1981:

MS Part Number	Item Name	A, B, C, N Wire Size	Length in Feet ± 0.5	Supersedes	Current Status
MS90328-30	Cable Assembly	0	100	MS25486-23	Inactive for new design
MS90328-31	Cable Assembly	00	20	MS25486-24	Inactive for new design
MS90328-32	Cable Assembly	00	30	MS25486-25	Inactive for new design
MS90328-33	Cable Assembly	00	40	MS25486-26	Inactive for new design
MS90328-34	Cable Assembly	00	60	MS25486-27	Inactive for new design
MS90328-35	Cable Assembly	00	80	MS25486-28	Inactive for new design
MS90328-36	Cable Assembly	00	100	MS25486-29	Inactive for new design

MS90347C, Cable Assembly External Electric Power, Aircraft,
28 Volt DC Operating Power, Dated 31 August 1978:

MS Part Number	Item Name	A, B, C, N Wire Size	Length in Feet ± 0.5	Supersedes	Current Status
MS90347-1	Cable Assembly	0	20	None	Superseded by MS90347-7
MS90347-2	Cable Assembly	0	30	None	Superseded by MS90347-8
MS90347-3	Cable Assembly	00	20	None	Superseded by MS90347-13
MS90347-4	Cable Assembly	00	30	None	Superseded by MS90347-14
MS90347-5	Cable Assembly	0000	20	None	Superseded by MS90347-19

TABLE A III (continued)

MS90347C, Cable Assembly External Electric Power, Aircraft,
28 Volt DC Operating Power, Dated 31 August 1978:

MS Part Number	Item Name	A, B, C, N Wire Size	Length in Feet +0.5	Supersedes	Current Status
MS90347-6	Cable Assembly	0000	30	None	Superseded by MS90347-20
MS90347-7	Cable Assembly	0	20	AN2551C20, MS25488-6 & MS90347-1	Current Part Number
MS90347-8	Cable Assembly	0	30	AN2551C30, MS25488-7 & MS90347-2	Current Part Number
MS90347-9	Cable Assembly	0	40	MS25488-8	Current Part Number
MS90347-10	Cable Assembly	0	60	MS25488-9	Current Part Number
MS90347-11	Cable Assembly	0	80	MS25488-10	Current Part Number
MS90347-12	Cable Assembly	0	100	MS25488-11	Current Part Number
MS90347-13	Cable Assembly	00	20	AN2551D20, MS25488-12 & MS90347-3	Current Part Number
MS90347-14	Cable Assembly	00	30	AN2551D30, MS25488-13 & MS90347-4	Current Part Number
MS90347-15	Cable Assembly	00	40	MS25488-14	Current Part Number
MS90347-16	Cable Assembly	00	60	MS25488-15	Current Part Number
MS90347-17	Cable Assembly	00	80	MS25488-16	Current Part Number
MS90347-18	Cable Assembly	00	100	MS25488-17	Current Part Number
MS90347-19	Cable Assembly	0000	20	AN2551E20, MS25488-18 & MS90347-5	Current Part Number

TABLE A III (continued)

MS90347C, Cable Assembly External Electric Power, Aircraft,
28 Volt DC Operating Power, Dated 31 August 1978:

MS Part Number	Item Name	A, B, C, N Wire Size	Length in Feet +0.5	Supersedes	Current Status
MS90347-20	Cable Assembly	0000	30	AM2551E30, MS25488-19 & MS90347-6	Current Part Number
MS90347-21	Cable Assembly	0000	40	MS25488-20	Current Part Number
MS90347-22	Cable Assembly	0000	60	MS25488-21	Current Part Number
MS90347-23	Cable Assembly	0000	80	MS25488-22	Current Part Number
MS90347-24	Cable Assembly	0000	100	MS25488-23	Current Part Number

MIL-C-7974/1A, Connector, Plug, Aircraft External Power
(115/200 Volt, 400 Hertz, Dated 8 September 1978:

MS Part Number	Item Name	A, B, C, N Wire Size	Supersedes	Current Status
M7974/1-1	Attachable Plug for Type 1, M7974/2 Cable Assemblies	2	None	Current Part Number
M7974/1-2	Attachable Plug for Type 1, M7974/2 Cable Assemblies	4	None	Current Part Number
M7974/1-3	Attachable Plug for Type 1, M7974/2 Cable Assemblies	1	None	Current Part Number
M7974/1-4	Attachable Plug for Type 2, M7974/2 Cable Assemblies	2	None	Current Part Number

SAE AS7974

TABLE A III (continued)

MIL-C-7974/1A, Connector, Plug, Aircraft External Power
(115/200 Volt, 400 Hertz, Dated 8 September 1978:

MS Part Number	Item Name	A, B, C, N Wire Size	Supersedes	Current Status
M7974/1-5	Attachable Plug for Type 2, M7974/2 Cable Assemblies	4	None	Current Part Number
M7974/1-6	Attachable Plug for Type 2, M7974/2 Cable Assemblies	1	None	Current Part Number

MIL-C-7974/2, Cable Assembly, External Power, Aircraft 115/200 Volt, 400 Hertz Power
Distribution Flight Line (for A/E 24A-166A), dated 8 September 1978:

MS Part Number	Item Name	A, B, C, N Wire Size	Length in Feet +0.5	Supersedes	Current Status
M7974/2-1	Cable Assembly, Type 1	2	40	None	Current Part Number
M7974/2-2	Cable Assembly, Type 1	2	60	None	Current Part Number
M7974/2-3	Cable Assembly, Type 1	2	80	None	Current Part Number
M7974/2-4	Cable Assembly, Type 1	2	100	None	Current Part Number
M7974/2-5	Cable Assembly, Type 1	4	40	None	Current Part Number
M7974/2-6	Cable Assembly, Type 1	4	60	None	Current Part Number
M7974/2-7	Cable Assembly, Type 1	4	80	None	Current Part Number
M7974/2-8	Cable Assembly, Type 1	4	100	None	Current Part Number

SAE AS7974

TABLE A III (continued)

MIL-C-7974/2, Cable Assembly, External Power, Aircraft 115/200 Volt, 400 Hertz Power Distribution Flight Line (for A/E 24A-166A), dated 8 September 1978:

MS Part Number	Item Name	A, B, C, N Wire Size	Length in Feet +0.5	Supersedes	Current Status
M7974/2-9	Cable Assembly, Type 1	1	40	None	Current Part Number
M7974/2-10	Cable Assembly, Type 1	1	60	None	Current Part Number
M7974/2-11	Cable Assembly, Type 1	1	80	None	Current Part Number
M7974/2-12	Cable Assembly, Type 1	1	100	None	Current Part Number
M7974/2-13	Cable Assembly, Type 2	2	40	None	Current Part Number
M7974/2-14	Cable Assembly, Type 2	2	60	None	Current Part Number
M7974/2-15	Cable Assembly, Type 2	2	80	None	Current Part Number
M7974/2-16	Cable Assembly, Type 2	2	100	None	Current Part Number
M7974/2-17	Cable Assembly, Type 2	4	40	None	Current Part Number
M7974/2-18	Cable Assembly, Type 2	4	60	None	Current Part Number
M7974/2-19	Cable Assembly, Type 2	4	80	None	Current Part Number
M7974/2-20	Cable Assembly, Type 2	4	100	None	Current Part Number
M7974/2-21	Cable Assembly, Type 2	1	40	None	Current Part Number
M7974/2-22	Cable Assembly, Type 2	1	60	None	Current Part Number
M7974/2-23	Cable Assembly, Type 2	1	80	None	Current Part Number
M7974/2-24	Cable Assembly, Type 2	1	100	None	Current Part Number